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AUTHOR Koppin, Mary K.
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ABSTRACT

This study proposes a method for reporting findings that combines true positives and true negatives to measure total accuracy of predictions. A retrospective study of dangerous behavior among criminally insane offenders in Colorado confirmed the findings of Cocozza and Steadman (1974) regarding the predictive validity of the Legal Dangerousness Scale (LDS). The Baxstrom patients on whom LDS was based were released over 10 years ago, and replication findings were remarkably similar. The sample was composed of younger, less institutionalized offenders with an average length of stay in hospital of four-and-a-half years. Of 111 male patients with two to four years at risk, less than three percent have been recommitted as legally insane. Over half were involved in significant posthospital disruption, and the behavior of 33 was classified as dangerous. In addition to four LDS items of criminal record, eight other high risk indicators in offender histories were found to be related to posthospital behavior. Guttman-type properties of ordinality and summation of unequal weights were not confirmed with the Colorado sample, although cummulative scale properties were suggested. The LDS was found to be more reliable for older offenders, and contrary to usual findings, the youngest age group accounted for proportionately less dangerous behavior. (Author)

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A Validation of the Legal Dangerousness Scale With Released Criminally Insane Offenders

Mary K. Koppin

Department of Research and Program Analysis

Colorado State Hospital

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A Validation of the Legal Dangerousness Scale With Released Criminally Insane Offenders[1]

The tendency for clinicians to overpredict dangerousness was dramatically demonstrated after the Baxstrom vs Herold (1966) U.S. Supreme Court decision which prompted the arbitrary release of nearly 1,000 patients from New York facilities for the criminally insane. Numerous studies of those offenders have concluded that they were neither very dangerous, nor very different from civilly committed patients in other New York hospitals (Steadman and Keveles, 1972; Steadman, 1973; Steadman and Cocozza, 1973, 1974). The Baxstrom population was middle-aged and had an average length of stay in security hospitals of 15 years. Five years later over half were still chronic mental patients in civil hospitals. Because of their long-term institutionalization, it has been assumed that the Baxstrom offenders were very different from contemporary patient populations and hospital practices.

From the Baxstrom research, Cocozza and Steadman (1974) developed an instrument that measures criminal history to predict future

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[1]This project was proposed by Michael Maselli. David Rose provided technical assistance. Comments by Henry Steadman on an earlier version of this paper are gratefully acknowledged.

dangerous behavior. The Legal Dangerousness Scale (LDS) was empirically derived from a systematic search for clues in offender histories that might have served as predictor variables. The product is a relatively simple and straightforward approach that objectively assigns offenders either to a high or low risk group according to age and LDS scores. The following study is an attempt to test the predictive validity of the LDS by retrospectively applying the Cocozza-Steadman technique to a population of younger and less institutionalized offenders in Colorado.

Purpose of the Study

Based on the previous findings, the research hypothesis was that LDS scores of 5 or more for offenders under the age of 50 years would accurately identify dangerous patients in a replication sample. The researchers were particularly interested in age group analyses to search for a more discriminating breakdown than over and under 50 years.

The LDS is limited to four aspects of criminal history: juvenile record, previous incarcerations, prior violence, and the instant offense. The researchers questioned the narrow reliance on pretreatment criminal events. A number of other disruptive events in social histories were thought to be logically related to LDS items and to the prediction of dangerous behavior. Childhood behavioral problems, length of stay in hospital, history of non-

violent crimes, and psychiatric diagnosis were some of the criteria predicted to be additional risk level indicators.

The Cocozza-Steadman reports on LDS ascribe Guttman-type properties of ordinality to the LDS and assign unequal weights (8, 4, 2 and 1) to the four nominal items. A coefficient of reproducibility of .91 was reported as evidence that the items met standard criteria for scaling. The scoring technique that implies that juvenile record (8 points) is twice as important as previous incarceration (4 points) was thought to be a problem. The researcher questioned the heavy LDS weight for presence of a single item which automatically assigns an offender to the high risk group. Reported Guttman properties suggest that offenders with a juvenile record would also have had previous incarcerations, and those with previous incarcerations would also score on the prior violence criterion, and so on. The pattern of item frequencies for this sample would be predictable if the Guttman assumption were valid.

Monahan (1973) and Levine (1975) discuss the methodological problems in evaluating the efficiency of clinical predictions. Of particular concern to this researcher is the inconsistency in reporting methods and the difficulty in comparing studies or populations. Practical interest in inaccurate predictions of safety is as important as the issue of inaccurate predictions of dangerousness, the more frequently cited problem in the literature.

The following study proposed:

1. To test the LDS cutting score of 5 and age under 50.
2. To search for more discriminative age breakdowns.
3. To test the ordinal properties of LDS and the assignment of unequal weights.
4. To determine if other disruptive events in offender histories are also predictive.

Method

Sample. Of 119 criminally insane patients released between July 1, 1972 and June 30, 1974, a sample of 111 male offenders was selected for study of community adjustment after two to four years at risk. All had been found not guilty by reason of insanity to criminal charges, and two-thirds of those had committed assaultive crimes against persons. Hospitalization at the only Colorado facility for the criminally insane, the Division of Forensic Psychiatry at the state hospital, was for an indeterminate period of time. The average length of stay was 4½ years, and the average age on admission was 29 years. Nearly half were under the age of 30 when released as no longer dangerous as a result of mental illness. All but 15% of the sample were released from minimum

security and maximum privilege programs. All were required by court order to be followed in aftercare programs.

Procedures. Evidence for the presence or absence of LDS variables in offender history was obtained from hospital case studies and FBI arrest records. Juvenile record was defined as present when the offender had been arrested for criminally delinquent acts and excluded status offenses. Previous incarcerations were limited to correctional sentences of 30 days or more in lock-up. The first four FBI index crimes of homicide, assault, robbery, and rape were defined as prior violence. In keeping with previous Steadman (1975) reports, first and second degree burglary were included as potentially violent and scored on the LDS item. The offense leading to hospital commitment was classified according to the Cocozza-Steadman categories of crime severity.

Outcome data was taken from medical records of the hospital's Forensic Aftercare program. Any posthospital behavior resulting in arrest and/or readmission to inpatient treatment in hospital was defined as known community disruption. Behavior was classified as dangerous when it involved the first four index crimes against persons and first and second degree burglary. Actual physical assault and any threats of physical violence serious enough to have resulted in lock-up for 24 hours or more was included in the definition of dangerous disruption. Nondangerous disruptions were

classified according to an adaptation of Smith et al. (1963) and Hilles (1970) readmission events.

Analysis of LDS/Age Validity. Patients were assigned either to the high or low risk group according to LDS scores and age at release. Behavior after release was dichotomized as dangerous vs. not dangerous, and the resulting classifications arranged in two-by-two tables. The extent to which risk level accurately distinguished the dangerous from the not dangerous behavior was tested by chi square, contingency coefficient, and percentage probability within each group. High risk patients who were dangerous after release (true positives) and low risk patients who were not dangerous (true negatives) were combined as total correct predictions to arrive at a percentage rate of accuracy. Age on release, in ten year intervals, was analyzed to determine if age alone is predictive. The number of accurate LDS risk assignments for each group was tested for significance by chi square. The mean ages of the high and low risk groups were compared for significance of differences, as were mean ages of the dangerous group vs. the not dangerous group by *t* tests.

Scale Properties. In a Guttman scale, items have a certain type of cumulative relationship which justifies the assumption of an ordinal ranking. A Goodenough scalogram analysis (Edwards, 1957)

was applied to test the scalability of the 4 LDS variables, and a coefficient of reproducibility was obtained. The appropriateness of the unequal weights assigned LDS items (8, 4, 2 and 1) was explored by analyzing each variable separately for relationship to subsequent dangerous behavior. Presence of an item was treated as a single high risk indicator and the absence, as a low risk indicator. Chi square, contingency coefficient, and accuracy rates for each variable were calculated.

Experimental scoring procedures included assigning each LDS variable equivalent weights (1 point) and adding the number of LDS criteria present. Probability of dangerous behavior was based on the proportions of patients who were dangerous from each (additive) scoring range from 0 to 4. Frequencies were displayed in expectancy charts as chances in 100 of dangerous disruption.

Related Disruptions. Pretreatment events that were also tested for relationship to the outcome criterion were analyzed as separate high risk indicators. All variables found to have predictive value at levels of probability ranging from .0001 to .01 were experimentally treated as scalable. Each item was assigned a weight of 1 if present and 0 if absent. Summation of the 4 LDS variables and 8 experimental high risk variables resulted in a scoring range of 0 to 12 points. Various cutting scores were tested to increase discriminative power and accuracy rates.

Findings

LDS/Age. There were 60 patients assigned to the high risk category; and, of those, 40 (67%) were in fact arrested after release. Of the 51 in the low risk group, 44 (86%) were, in fact, not arrested. The LDS/Age prediction for arrest is statistically significant with x^2 (df 1)=31.65, $p < .0001$.

Counting only disruptions classified as dangerous, including those which resulted in rehospitalization, 29 of the 33 dangerous patients (88%) came from the LDS/Age high risk group. Total correct predictions have an accuracy rate of 68% for the Colorado sample and 71% for the Baxstrom sample. These data are compared in Table 1. The Cocozza-Steadman findings are confirmed with x^2 (df 1)=21.63, $p < .0001$.

Insert Table 1 about here

Relatively clear and unexpected differences emerged during examination of the frequency of dangerous behaviors within each age group. While no patients over 50 years of age were dangerous, the youngest age group had proportionately less dangerous disruption than those in their thirties and forties. Nearly 80% of the patients in their twenties were not arrested or rehospitalized. The chi

Table 1. Dangerous Behavior After Release by Combined Measure of Age and LDS Score

Baxstrom Patients N=98	Dangerous	Not Dangerous	
High Risk	11(31%)	25(69%)	36
Low Risk	3(5%)	59(95%)	62
Totals	14	84	98

x^2 (df 1)=12.30 $p < .001$
C=.334
Total accuracy=71%

Colorado Patients N=111	Dangerous	Not Dangerous	
High Risk	29(48%)	31(52%)	60
Low Risk	4(8%)	47(92%)	51
Totals	33	78	111

x^2 (df 1)=21.63 $p < .0001$
C=.404
Total accuracy=68%

Table 2. Dangerous Behavior After Release by Age on Release in Years

	19-29	30-39	40-49	50+	Totals
Dangerous	11(21.2%)	13(46.4%)	9(42.9%)	0	33
Not Dangerous	41(78.8%)	15(53.6%)	12(57.1%)	10(100%)	78
	52(100%)	28(100%)	21(100%)	10(100%)	111

x^2 (df 3)=11.52 $p < .01$

Table 3. Accuracy of LDS Risk Assignment and Behavior After Release by Age

LDS Predictions	19-29	30-39	40-49	50+	Totals
Accurate	32(61.5%)	17(60.7%)	17(80.9%)	10(100%)	76(68.5%)
Inaccurate	20(38.5%)	11(39.3%)	4(19.1%)	0	35(31.5%)
	52(100%)	28(100%)	21(100%)	10(100%)	111(100%)

x^2 (df 3)=8.10 $p < .05$

square value is significant, $x^2(df3)=11.52$, $p<.01$, and the data are in Table 2.

Insert Table 2 about here

There was no significant difference between mean ages of the dangerous ($\bar{x}=33.0$) and the nondangerous ($\bar{x}=33.3$). False positives ($\bar{x}=29.0$) and false negatives ($\bar{x}=28.8$) were, however, younger than the true positives ($\bar{x}=33.6$) and true negatives ($\bar{x}=36.2$). Initial analysis and findings suggested that the LDS/Age technique might be more reliable for middle-aged and older offenders than for younger men. The number of accurate predictions for each age group was tested by chi square. The distribution was found to be statistically significant at the .05 level of probability, as shown in Table 3.

Insert Table 3 about here

The LDS/Age technique of Cocozza and Steadman is supported by significant results displayed in Tables 1, 2, and 3. The major research hypothesis is confirmed. The most obvious evidence is in relation to the 50 years of age cutting score. As shown in Table 3, 100% of the predictions for men over 50 are correct. The accuracy

rate for men in their forties is over 80 percent. Even though inaccurate predictions for those in their twenties and thirties approaches 40%, there are still proportionately more true predictions than false for all age groups, as noted in the right-hand row totals.

Scale Properties. Three of the 4 LDS items occurred with nearly the same frequency. Presence of a juvenile record was found in the histories of 46 patients. Two or more previous incarcerations were events in the background of 47, and 52 had a record of prior violent crime. A serious instant offense (1 LDS point) was present for 97 patients. On the hypothesis that the items constituted a Guttman-type scale, frequency and order were tested by scalogram. A coefficient of reproducibility of .83 was obtained, compared to the coefficient of .91 in the Baxstrom study. Although C approaches .85 which Guttman (1944) says is an efficient approximation to scale, Edwards (1957) prefers .90 as minimal evidence. Ordinality, at least in the Guttman sense, seems unwarranted for this sample.

From the LDS weight assignments of 8, 4, 2 and 1 point, any given score within the range 0 to 15 is perfectly reproducible. There is only one possible combination of LDS criteria to produce each possible total score. The published Baxstrom reports did not describe the research method used for derivation of weights. The scoring system does have value simply as a code for identifying

which variables are present, and this may have been the reproducibility Cocozza and Steadman intended.

The second analysis of the scale's properties related to summation of unequally weighted items. As described by the expectancy chart in Figure 1, the higher the LDS score, the greater the likelihood of dangerous disruption.

Insert Figure 1 about here

Each LDS item was analyzed separately and found to be accurate as single high risk indicators, at levels of significance ranging from $p < .0001$ to $p < .01$. Cumulative properties are displayed in Figure 2. Compared to Figure 1, the distribution suggests a somewhat more discriminative power in simply counting the number present and adding.

Insert Figure 2 about here

Patients with only one of the 4 LDS variables had a 6% chance of dangerous behavior; those with any two, a 35% risk; with any three, a 41% risk. Note that presence of all 4 criteria (15 under LDS scoring) increases a patient's chances of being dangerous to 58 percent.

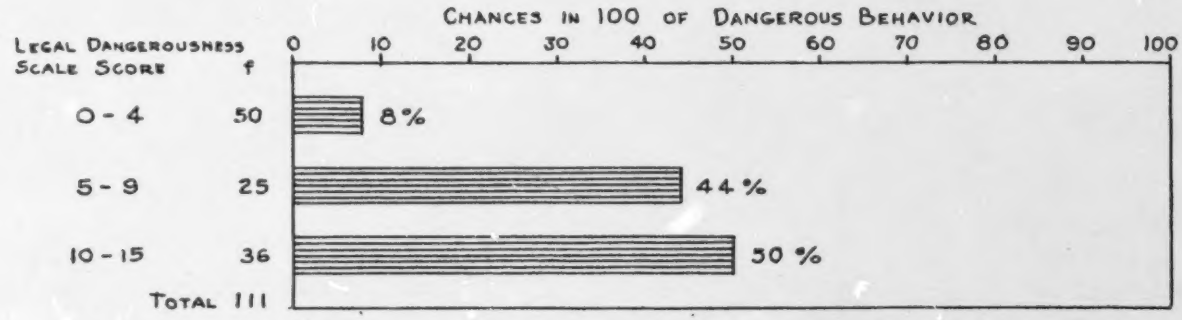

Figure 1. Risk of postrelease dangerous behavior in groups defined by LDS score. Juvenile record = 8, Previous incarceration = 4, Prior violence = 2, Serious instant offense = 1.

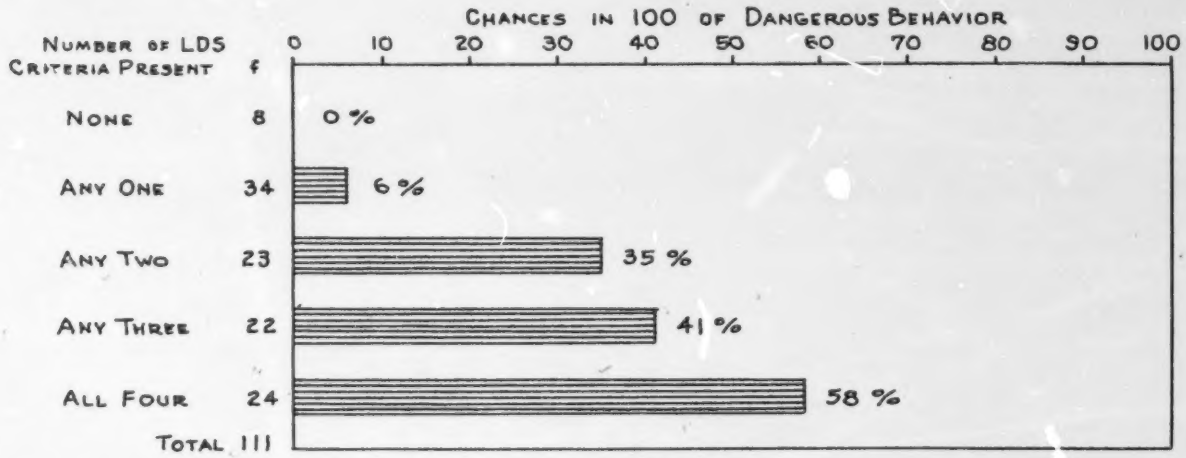

Figure 2. Risk of postrelease dangerous behavior in groups defined by assignment of equal weights (1) to each LDS criterion.

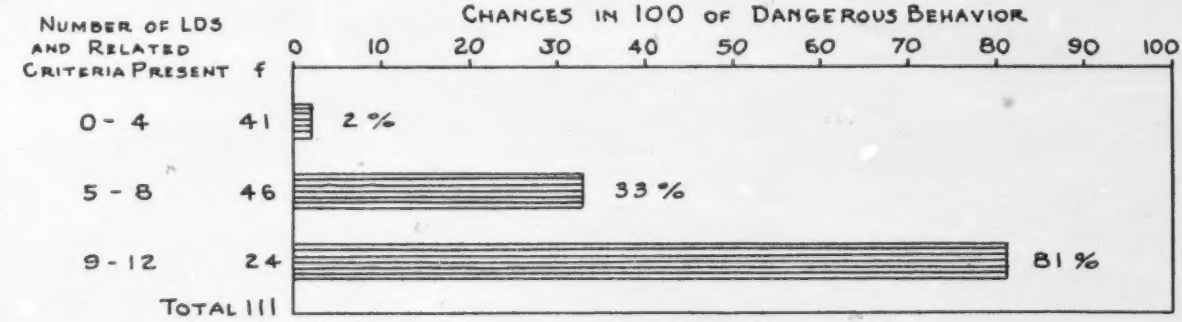

Figure 3. Risk of postrelease Dangerous Behavior in groups defined by assignment of equal weight (1) to 4 LDS and 8 additional criteria.

Related Disruptions. Separate analyses of each LDS item and exploratory variable resulted in identification of a total of 12 high risk indicators, summarized in Table 4. The highest total accuracy rate was found with a history of (any) previous correctional incarcerations, and the least predictive variable was the offense precipitating the original hospital commitment. No significant differences were found in diagnostic variables. Approximately half of the dangerous behavior after release was accounted for by psychotics, and the other half by personality disorders, alcoholics, and drug dependents.

Insert Table 4 about here

Cumulative properties were suggested from summation of all high risk indicators present and using various experimental cutting scores on the 0 to 12 point "scale." These cutting scores resulted in the following:

(a) High risk cutting score of 5 or more:
$x^2(df1)=23.18$, $p<.0001$; $C=.415$; total accuracy=65%.

(b) High risk cutting score of 6 or more:
$x^2(df1)=21.63$, $p<.0001$; $C=.403$; total accuracy=68%.

(c) High risk cutting score of 7 or more:
$x^2(df1)=24.61$, $p<.0001$; $C=.426$; total accuracy=77%.

Table 4

Summary of Risk Level Assignments and Dangerous Behavior After Release

Criteria Present in Offender History	True Positives	False Positives	False Negatives	True Negatives	Total % accuracy *	Chi square	Contingency coefficient	Probability
(Any) previous incarceration	27	20	6	58	77%	29.98	.461	.0001
Regressive security transfer	22	23	11	55	69%	13.30	.327	.0005
Prior violence	24	28	9	50	67%	12.63	.319	.0005
Probation or parole	19	20	14	58	69%	10.38	.292	.001
Drunk/disorderly arrests	22	27	11	51	73%	9.66	.283	.005
Juvenile record	21	25	12	53	67%	9.53	.281	.005
Hospital escape	21	25	12	53	67%	9.53	.281	.005
School disruption < age 18	26	37	7	41	60%**	9.29	.277	.005
Nonviolent crime of theft	17	18	16	60	70%	8.69	.269	.005
Released from security ward	10	7	23	71	73%	8.13	.261	.005
Previous treatment	23	33	10	45	61%**	6.96	.243	.01
Severe instant offense	33	64	0	14	42%**	6.78	.239	.01

*[(True positives + true negatives) ÷ Total N]x 100=percent accuracy in distinguishing the dangerous from the nondangerous after release. Spearman rank correlation with $\underline{C}$ is r_s=.89. Upper limit of $\underline{C}$ (1)=.707.

**Decreased accuracy rate due to large numbers of false positives.

Using the expectancy chart method of analysis, a patient's chances in 100 for dangerous behavior after release increase dramatically as the number of items present increases. Offenders with 9 or more of the 12 high risk indicators have an 81% risk of being arrested or rehospitalized following dangerous disruption in the community.

Insert Figure 3 about here

Summary

1. LDS/Age Validity. The Cocozza-Steadman technique is as valid for the Colorado sample as it was for the Baxstrom offenders. Patients under 50 years of age who score 5 or more LDS points are accurately identified as dangerous. Statistical significance is beyond the .001 level of probability with several methods of analysis.

2. Discriminative Age Breakdown. Age alone is significantly related to dangerous behavior after release, but the direction of differences is surprisingly unexpected. Offenders in their twenties had proportionately less dangerous behavior after release than men in their thirties and forties.

3. Scale Properties. Three LDS variables occurred with nearly equal frequency: juvenile record, 2 or more previous incarcerations,

and prior violent crime. The number of LDS variables present was cumulative, although not in the rank order of a Guttman-type pattern. Ordinal assumptions are not confirmed by the replication methods. Summation of unequally weighted LDS items appears unwarranted in this sample.

4. Related Disruptions. Childhood behavioral problems in school, previous psychiatric treatment, and prior nonviolent crimes of theft are examples of exploratory items found to be significantly accurate indicators of high risk. A number of combinations and weights was attempted to scale the nominal and unordered data inherent in exploratory research. While none yielded impressively high accuracy rates, the Legal Dangerousness Scale in its present form is not necessarily the most useful.

Discussion

Qualitative review of a person's criminal record is a common feature of practical decisions about individual risk. The Legal Dangerousness Scale is one means of quantifying history in a replicable method for retrospective and comparative studies. Its value as an aid to actual clinical decision making is limited because events of criminal record are fixed variables, and the LDS assigns risk level before hospitalization even begins. The only allowance for change in the LDS/age technique is to wait until an offender grows older and safer. Yet the youngest

offenders in this study were less dangerous than men in their thirties and forties. Amenability to treatment or susceptibility to change antisocial values are possible explanations, although the false negatives also involved younger men. Prediction of future behavior from criminal record may simply be less reliable for young offenders.

The clinical decision to release as no longer dangerous due to mental illness was overwhelmingly correct, if one looks only at the official consequences of dangerous behavior among these patients. Less than three percent of each group were recommitted as legally insane or incompetent to proceed to trial. Differential law enforcement as applied to ex-mental patients, and the social context in which dangerous behavior is displayed, should be included in further research of recidivism, with an attempt to differentiate severity of dangerous behavior and its consequences.

The finding that two different groups of criminally insane offenders displayed similar rates of posthospital disruption tempts one to generalize from these highly selected samples. The Colorado patients were at risk on the basis of psychiatric recommendation and court-ordered conditions of aftercare, and as such are not likely to be representative of the hospital population from which they came. The small number of Baxstrom patients actually released to communities is also a small proportion of all those affected by the 1966 court

decision. Neither sample on which the LDS is validated here represents an unfettered release of patients predicted by psychiatrists to be dangerous. All had been predicted to be safe. The striking similarities in outcome may only represent similar base rates of criminal behavior and psychiatric disruption, rather than their predictability.

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